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Drive-Through COVID-19 Testing During the 2020 Pandemic: A Safe, Efficient, and Scalable Model for Pediatric Patients and Health Care Workers

Erin F. Flynn, MD; Elizabeth Kuhn, MD; Mohammed Shaik, MD, PhD; Elizabeth Tarr, MD; Nicole Scattolini, RN; Allison Ballantine, MD

From the The Children's Hospital of Philadelphia (EF Flynn, E Kuhn, M Shaik, E Tarr, N Scattolini, and A Ballantine), Philadelphia, Pa; University of Pennsylvania Perelman School of Medicine (A Ballantine), Philadelphia, Pa; and Division of General Pediatrics, The Children's Hospital of Philadelphia (A Ballantine), Philadelphia, Pa

The authors have no conflicts of interest to disclose.

Address correspondence to Erin F. Flynn, MD, The Children's Hospital of Philadelphia, 3401 Civic Center Blvd, Philadelphia, PA 19104 (e-mail: flynn@chop.edu).

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WHAT'S NEW

High-volume testing is critical to COVID-19 containment. In this report, we share our team's development of a pediatric-focused drive-through COVID-19 testing center, and discuss how this process can inform future pediatric public health efforts.

IDENTIFYING INDIVIDUALS INFECTED by the novel coronavirus is critical to mitigating its deleterious effects. Challenges have arisen around how to test high volumes of patients while minimizing risk of disease spread. In this report, we outline our team's approach, process, and lessons learned in developing a pediatric-focused high-volume COVID-19 testing site in the United States.

INNOVATION AND CONTEXT

Multiple COVID-19 testing models have been employed worldwide, including traditional send-out testing, walk-in sites, drive-through operations, and in-home testing.^{1–5} In early March 2020, providers in our health care system's primary care network used send-out orders because testing infrastructure and supply were limited. As testing demand increased, processing times spiked and throughput suffered, triggering the need for a more efficient model. Our physician leadership recognized that the 24-hour turnaround time on our system's in-house COVID-19 test would benefit the community and saw the opportunity to make it accessible quickly.

High-volume testing in any format requires substantial planning and availability of materials and staff. Drive-through testing has several advantages: it promotes social distancing, prevents infectious individuals from entering

an enclosed building, and offers efficiency and convenience to families.⁶ Our team, led by attending and resident pediatricians, nursing leadership, operations and facilities managers, hospital administrators, information technology (IT) specialists, and improvement advisors, set about developing a model for increasing volume and optimizing use of limited resources via drive-through (and walk-through) nasopharyngeal swab testing.

Our target pediatric population included children referred by the Department of Public Health and by our system's primary care practices (via phone screening or in-person evaluation). Testing eligibility was based on Centers for Disease Control and Prevention guidelines⁷ and providers' clinical judgment. Integral to our mission, we also prioritized testing employees in our system in an effort to return healthy individuals to work and limit risk of workplace transmission.

PROCESS AND RESULTS

Our pilot site was in the parking lot of an inner-city pediatric primary care clinic serving West Philadelphia. This location allowed physical separation between primary care and COVID-19 testing patients as well as 1-way traffic flow through the testing area. We created a "fast lane" for older children and employees who would likely tolerate testing easily, and a "slow lane" for cars with multiple young or potentially fussy patients. There was also a safe path for families without cars to access "walk-through" testing away from vehicle traffic.

With the site identified, improvement advisors and clinicians built a process map to illustrate traffic flow and staff roles. IT created electronic health record buildouts for

clinician testing orders, referrals, and patient scheduling. The Infectious Disease and Infection Prevention & Control teams optimized protocols for obtaining, storing, and transporting specimens. The Facilities Department was responsible for supply acquisition and on-site storage. Residents and Child Life Services created patient education handouts to help prepare families for testing.

Staffing models and job aids were built for each role: 1) Wayfinders (resident physicians) directed vehicles and walk-through patients, offered patient information handouts, and answered clinical questions; 2) Swabbers (nurses) physically performed the test; and 3) Test Preppers (medical assistants) prepared swab kits.

A high-fidelity simulation was performed before launch to ensure proper flow, staff proficiency in test administration, and adherence to personal protective equipment (PPE) guidelines. The clinic was launched March 18, 2020; days and hours of operation were updated daily based on demand. A second site was opened in suburban Philadelphia on March 23, 2020.

Staff expected to be within 6 feet of patients were supplied daily with PPE (face shield, mask, gown, gloves) from existing hospital stock. Swabbers and any Wayfinders with patient contact wore a face shield, mask, gown, and gloves, and changed every 3 hours or sooner if soiled (gloves were changed before each patient). Test Preppers and other Wayfinders did not require PPE because they remained in the “clean zone.”

Figure 1 demonstrates that between March 18, 2020 and March 31, 2020, Site 1 completed 901 tests, ranging from 11 to 127 tests per day. This represents 9.7% of all tests performed in Philadelphia during that time.⁸ The positive rate was 8.5% compared to the citywide rate of 20%.⁸ During

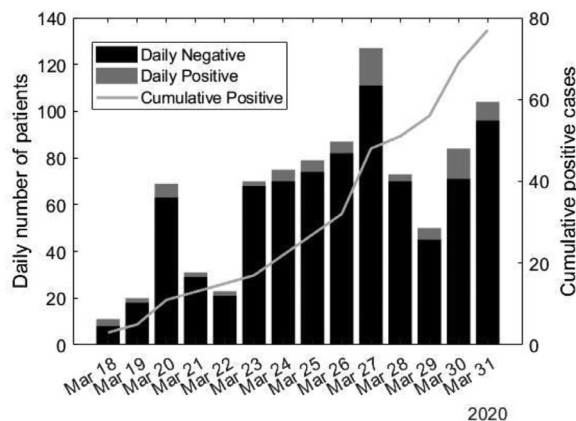


Figure 1. Daily and cumulative test counts at Site 1. Cumulative tests performed during study period: 901. Cumulative positive test results: 77. Note that weekend scheduling availability was limited, resulting in low volumes on March 21 to 22 and March 28 to 29. Site 2 data not included as study time frame did not include the site at full ramp-up.

the study period, 26% of patients tested were under 18 years old, and the peak age range for tested patients was 30 to 39 years old, as shown in Figure 2. Testing efficiency increased such that our team was swabbing two patients every 5 minutes.

DISCUSSION

In this report, we discuss design and implementation of a high-volume COVID-19 drive-through testing model for children and pediatric health care workers. Our innovations allowed us to test patients rapidly, avoid long lines, conserve PPE, maintain excellent patient and family

Percent of Total Tests Performed by Age Group, March 18 through March 31, 2020

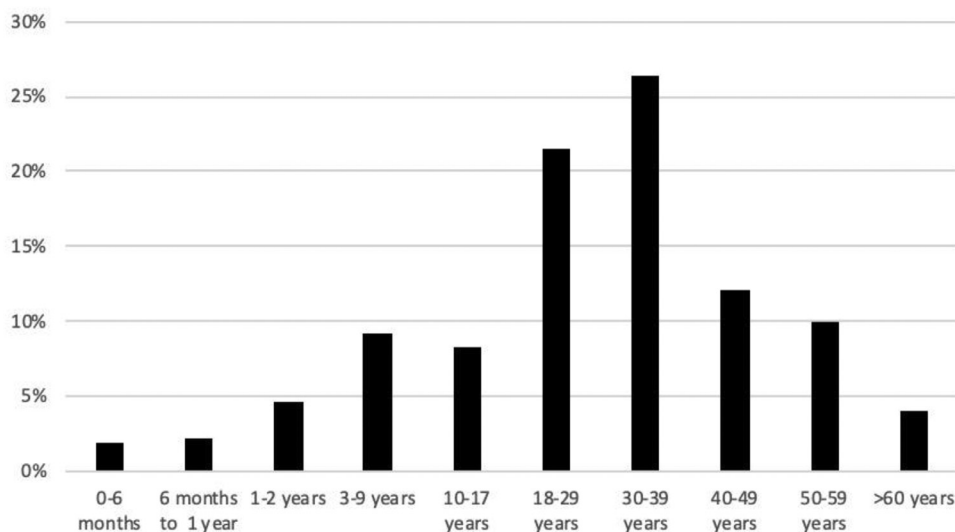


Figure 2. Age ranges of tested patients at Site 1 from March 18, 2020 to March 31, 2020. The high rate of tested patients over 18 years old in this initial phase of the testing site demonstrates the key impact of helping uninfected employees return to work. This may also demonstrate pent-up demand for employee testing for return to work, now able to be met at high volume by our drive-through site.

experience, and scale and reproduce the model to increase volume. Our age data suggest that our testing population included a significant portion of health care workers serving children, highlighting our critical contribution of helping healthy employees return to work.

As we look to further applications of this model, we reflect on critical lessons learned:

1. *Testing children requires creativity and flexibility.* For example, though most children tolerated in-car testing well, Swabbers' success and family experience were improved through creation of a "hot zone" for especially fussy or anxious children to sit in caregivers' laps for testing outside the car. Efficiency was maintained through the fast lane-slow lane setup.
2. *Site-specific knowledge is crucial.* Clinic staff, redeployed to aid testing efforts, provided expertise on traffic burden, pedestrian flow, and unsecured entry points, essential in ensuring safety and efficiency.
3. *Change is a constant—and a strength.* Workflow changed continually for the first several days as operations were streamlined and our team grew. Transparency about the need for flexibility and encouraging feedback and innovative thinking from each team member were critical.
4. *Create institutional memory.* Leadership continuity was crucial during the first days as change occurred rapidly. Simultaneously, centralized training documents with roles and responsibilities were developed, updated frequently, and disseminated, facilitating onboarding of new team members.
5. *Unforeseen challenges arise.* More than a week after launch, some families expressed concern about seeking pediatric care at the clinic abutting our testing site. In response, clinic leadership improved communication about the site during appointment reminders and via hold messages in the phone system.
6. *Trainees play a vital role.* A flexible, knowledgeable, and ready workforce, resident physicians played a critical role in operationalizing the drive-through vision.

NEXT STEPS AND CONCLUSION

With multiple sites operational, we must now further improve access to COVID-19 testing. Along with increasing the number of sites, we hope to expand to groups not initially tested given resource constraints, including parents of pediatric patients and other workers who serve children, like education and childcare professionals. Considering health equity is also critical, lowering barriers to testing for children who have difficulty accessing health care more broadly.

Lessons from our experience will inform future initiatives. Should a vaccine against COVID-19 become available, our setup could easily pivot to administering immunizations. Furthermore, the ability to operationalize

a testing site on short notice would be ideal for future COVID-19 outbreaks. If a COVID-19 outbreak co-occurs with influenza season, dual swab testing would be an important target for this model.

Other than COVID-19, any disease with a spike in cases, such as a community measles outbreak or future novel pandemic, would be an excellent candidate for this model. Hospital leadership is already discussing using our model for influenza testing in our network this year; influenza vaccination for children and employees would also be well suited to this setup.

Sharing data, best practices, process flow maps, patient education handouts, and training guides is critical in helping pediatric health systems nationwide reduce administrative burden of opening testing sites and troubleshoot problems specific to pediatric testing.⁹ Ultimately, we hope that our process and lessons learned implementing a pediatric-focused drive-through testing site will not only inform similar efforts in the near term, but also serve as an approach for broader pediatric public health efforts in the future.

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